

CLAIMS

1. A module comprising a connector (6) having metal terminals for connection, and a circuit board (1) mounting electronic components (3A, 3B, 4), said connector and said board being connected to each other through metal leads (7), wherein:

(A) the surface of said connector (6) on the side being connected to said board, said metal leads (7), and said electronic components (3A, 3B, 4) are sealed with the same thermosetting resin (9),

(B) said thermosetting resin (9) is in solid state at temperatures of 40°C or below before curing, and

(C) the thickness of said thermosetting resin (9) sealing said electronic components is changed depending on the heights of said electronic components (3A, 3B, 4).

2. The module according to Claim 1, wherein:

said thermosetting resin is an epoxy resin that contains inorganic fillers and is in solid state at temperatures of 40°C or below.

3. The module according to Claim 1, wherein:

said thermosetting resin has the following resin physical properties after curing,

linear expansion coefficient; 8 - 25 ppm/°C,

modulus of elasticity; 8 - 30 GPa, and

glass transition temperature; 80 - 200°C.

4. The module according to Claim 1, wherein:
the glass transition temperature of said circuit board is 150°C or higher.

5. The module according to Claim 1, wherein:
ends of said metal leads are inserted in through holes formed in said board and thereafter fixed by using a solder or a conductive adhesive.

6. The module according to Claim 1, wherein:
said electronic components are electronic components including a ball grid array (BGA) (11) or a chip scale package (CSP) (13), and
a circuit board (1A) mounting said BGA or CSP has through holes (19) having diameters of 0.1 mm - 10 mm and allowing said thermosetting resin to flow via said through holes.

7. The module according to Claim 1, wherein:
said circuit board is a printed board, and
a metal base or a plastic composite (14, 17, 18) for heat radiation is disposed just under said printed board mounting a power semiconductor chip that generates heat.

8. The module according to Claim 7, wherein:
said metal base or said plastic composite for heat radiation has a smaller area than said printed board.

9. The module according to Claim 1, wherein:

a metal- or plastic-made jig for mounting said module in an automobile engine room or on an engine is disposed on a rear surface of said circuit board.

10. The module according to Claim 1, wherein:

only the electronic-component mounting surface of said circuit board is sealed with said thermosetting resin, and an opposite surface of said circuit board is fixed to or disposed on a metal or plastic casing including said connector by sticking, adhesion or a mechanical manner.

11. The module according to Claim 1, wherein:

a metal or plastic composite (20) is disposed on a surface opposite to said circuit board with said electronic components and said thermosetting resin sealing said electronic components interposed therebetween.

12. A module comprising a connector (6) having metal terminals for connection, and a circuit board (1) mounting electronic components, said connector and said board being connected to each other through metal leads (7), wherein:

(A) the surface of said connector on the side being connected to said board, said metal leads, and said electronic components are sealed with the same thermosetting resin,

(B) said thermosetting resin is in solid state at

temperatures of 40°C or below before curing,

(C) the thickness of said thermosetting resin sealing said electronic components is changed depending on the heights of said electronic components, and

(D) said connector (6) is disposed perpendicularly to a surface of said board being covered with said thermosetting resin sealing said electronic components or disposed on a surface of said board on the side opposite to the surface covered with said thermosetting resin.

13. A method for fabricating a module in which a connector (6) having metal terminals for connection, a circuit board (1) mounting electronic components including a BGA or a CSP, and metal leads (7) connecting said connector and said board to each other are molded with a resin, the method comprising the steps of:

preparing one of a low-pressure transfer molding machine and a compression molding machine with molding pressure of 5 - 70 kg/cm² and molding temperature of 150 - 180°C, or an injection molding machine with molding pressure of 20 - 100 kg/cm² and molding temperature of 150 - 180°C;

preparing thermosetting resin that is in solid state at temperatures of 40°C or below before curing;

sealing the surface of said connector on the side being connected to said board, said metal leads, and said electronic components with the same thermosetting resin by using one of said molding machines; and

changing the thickness of said thermosetting resin

sealing said electronic components depending on the heights of said electronic components in said sealing step.

14. The method for fabricating a module according to Claim 13, wherein:

said circuit board is fixed to or disposed on a metal or plastic casing by sticking or adhesion to which said connector is tentatively fixed in advance, and thereafter said electronic components and a connector portion are integrally molded with said thermosetting resin.